

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-162525

(43)Date of publication of application : 20.06.1997

(51)Int.Cl. H05K 3/28
H01L 21/56

(21)Application number : 07-318053 (71)Applicant : OKI ELECTRIC IND CO LTD

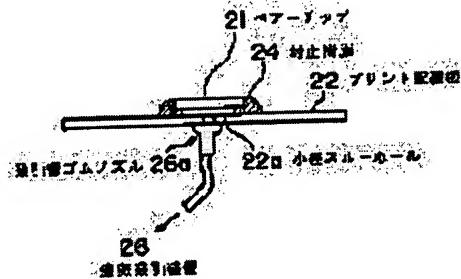
(22)Date of filing : 06.12.1995 (72)Inventor : YOSHIDA AKIO

(54) PROCESS FOR APPLYING SEALING RESIN TO BARE CHIP IN FLIP CHIP MOUNTING

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a process for applying a sealing resin to a bare chip in a flip chip mounting method which has an excellent moisture resistance, durability and shock resistance and a high reliability to perform a resin sealing quickly and surely without any necessity of holding obliquely a printed wiring board in the case of the working of applying the sealing resin to the bare chip.

SOLUTION: In a process for applying a sealing resin to a bare chip in a flip chip mounting method, exhausting the air present in the space between a bare chip 21 and a printed wiring board 22 for mounting the chip 21 thereon by an air sucking device 26 attached to a small-diameter through hole 22a, simultaneously with this, a sealing resin 24 is made to flow into the space to complete its application work after confirming its filling into the space.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

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[Kind of final disposal of application other than
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application converted registration]

[Date of final disposal for application]

[Patent number]

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[Number of appeal against examiner's
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CLAIMS

[Claim(s)]

[Claim 1] The closure resin spreading process to the flip chip mounting bare chip characterized by exhausting the space between said flip chip mounting bare chips and printed wired boards with an air blowdown means, and performing a resin seal in the spreading process of the closure resin in the flip chip mounting approach.

[Claim 2] The closure resin spreading process to the flip chip mounting bare chip according to claim 1 said whose air blowdown means are the vacuum devices prepared in the closure resin spreading work area to a flip chip mounting bare chip.

[Claim 3] The closure resin spreading process to flip chip mounting according to claim 1 said whose air blowdown means is the air aspirator connected with the minor diameter through hole established in the opposite location core under [of a printed wired board] a bare chip.

[Claim 4] The closure resin spreading process to the flip chip mounting bare chip according to claim 1 which is the dispenser which said air blowdown means is connected with the minor diameter through hole established in the opposite location core under [of a printed wired board] a bare chip, and is driven by the compressed air.

[Claim 5] The closure resin spreading process to the flip chip mounting bare chip according to claim 1, 2, 3, or 4 by which level maintenance of said printed wired board was carried out.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the closure resin spreading process excellent in the moisture resistance in the flip chip mounting (henceforth F-C mounting) approach, endurance, and shock resistance.

[0002]

[Description of the Prior Art] The conventional F-C mounting approach was performed in order of the process shown below. That is, after carrying the (1) bare chip 1 in a printed wired board 2 by soldering, thermocompression bonding, etc., the printed wired board 2 in which the bare chip 1 was carried is heated at 60-100 degrees C with a hot plate (or electric furnace) 3.

(2) While heating a printed wired board 2, lean the printed wired board 2 in which the bare chip 1 was carried (referring to drawing 8 and theta show whenever [tilt-angle]).

(3) Carry out initial-complement dropping of the closure resin 4 by 5, such as a dispenser, at the bare chip 1 top-chord side of the printed wired board 2 in the condition of having been heated, in which the bare chip 1 was carried (refer to drawing 9).

(4) The closure resin 4 dropped at the printed wired board 2 rotated resin on the underside of a bare chip 1 only with the so-called fluidity of the closure resin 4 that bare chip 1 underside is transmitted with gravity, and was filled up with and closed (refer to drawing 10).

[0003]

[Problem(s) to be Solved by the Invention] However, at the spreading process of the closure resin in the above-mentioned F-C mounting approach, since closure resin flows an inclined plane with gravity and turns to the bare chip lower part, the problem of requiring long duration is in spreading.

[0004] Moreover, when the gap of a bare chip and a printed wired board was small, or when bad fluid closure resin was used, closure resin may turn thoroughly between a bare chip and a printed wired board, and the trouble was in it moisture resistance, endurance, and in respect of shock resistance.

[0005] Furthermore, when it was not able to check whether closure resin turns and it fills up with it up to bare chip 1 underside unless it removed the bare chip, and closure resin 4 was dropped, the printed wired board 2 needed to be leaned and spreading of the closure resin in F-C mounting to a big printed wired board had the trouble of being difficult.

[0006] The place which it is made in order that this invention may solve the above-mentioned trouble, and is made into the object is to offer the closure resin spreading process of the bare chip in the highly reliable F-C mounting approach of having not inclined a printed wired board although spreading of closure resin is performed, and the resin seal of the lower space of a bare chip having been promptly carried out by the air blowdown means, and having excelled in moisture resistance, endurance, and shock resistance.

[0007]

[Means for Solving the Problem] In the closure resin spreading process to the bare chip in the F-C mounting approach, in order to attain the above-mentioned object, this invention is filled up with closure

resin and establishes the process completed in the closure resin spreading activity of a bare chip at the same time it discharges the air between the printed wired boards which mount a bare chip and this with air blowdown means, such as vacuum devices.

[0008] Since the minor diameter through hole is established in the core of an opposite region with the bare chip of a printed wired board, it fills up with closure resin promptly from this through hole, and it becomes unnecessary to incline a printed wired board according to this. Moreover, in the minor diameter through hole section, it can check that it has filled up with closure resin, and the air currently mixed in the closure resin with which it filled up is also simultaneously removed at the time of restoration.

[0009]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained with reference to a drawing. Drawing 1 - 5 are process drawing as 1st operation gestalt of this invention.

Drawing 1 is the appearance perspective view showing a bare chip 11, and bump 11a of many spherical electrodes is arranged around the underside. Drawing 2 is the appearance perspective view of the printed wired board 12 aiming at carrying a bare chip 11, the F-C mounting pad 13 is arranged and minor diameter through hole 12a is arranged in the core.

[0010] Next, the routing of the F-C mounting approach concerning this invention is explained. First, much minute spherical electrode bump 11a is arranged on the outskirts of an underside of a bare chip 11 (drawing 1). After carrying out alignment of this bump 11a to the F-C mounting pad 13 of a printed wired board 2 (drawing 2), connection loading is carried out by soldering, thermocompression bonding, etc. (drawing 3).

[0011] After F-C mounting of the bare chip 11 is carried out at a printed wired board 12, dropping supply of the closure resin 14 is carried out in dispenser 15 grade around the bare chip 11 of a printed wired board 12 (drawing 4). Dropping supply of the closure resin by dispenser 15 grade working in the container (not shown) space which made it possible to make a resin seal region into a vacua, and supplying the closure resin to bare chip 11 perimeter, the inside of the above-mentioned container is made into a vacua, and it goes. The closure resin of bare chip 11 perimeter supplies closure resin to the perimeter of a bare chip 11 with progress of a vacua in order to decrease in number, and to complement the decrement, as the inside of a container approaches a vacua.

[0012] By doing in this way, closure resin can supply the perimeter of a bare chip 11 enough. And when closure resin can be checked from minor diameter through hole 12a of the printed wired board 12 of the bare chip 11 lower part, a vacua is stopped, and supply of closure resin 14 to bare chip 11 perimeter which performed F-C mounting is ended. Drawing 5 is the important section appearance perspective view showing this condition.

[0013] Moreover, drawing 6 is the important section sectional side elevation in which showing the 2nd operation gestalt of the closure resin spreading process in the F-C mounting approach concerning this invention, and having shown the equipment which attracts the air between a bare chip 21 and a printed wired board 22. The supply approach of the closure resin to F-C mounting which attracts and fills up with this operation gestalt into the periphery of a bare chip 21 with a dispenser etc. the closure resin 24 by which dropping supply was carried out (not shown) between printed wired boards 22 by connecting attraction section rubber nozzle 26a of the air aspirator 26 with minor diameter through hole 22a, and attracting air in the direction of an arrow head is shown. And according to this operation gestalt, when closure resin is checked in attraction section rubber NOZORU 26a of the air aspirator 26, that what is necessary is just to suspend actuation of the air aspirator 26, bare chip 22 lower space is filled up with a well head for closure resin, and, thereby, the effectiveness as the object is acquired.

[0014] Furthermore, drawing 7 is the important section sectional side elevation showing the 3rd operation gestalt of this invention, and configurations which supply closure resin 34 to the direct F-C mounting section by 37, such as a dispenser, are shown. In this case, F-C mounting of the bare chip 31 is carried out first at a printed wired board 32. A dispenser 37 is inserted in minor diameter through hole 32a prepared in the printed wired board 32 of the bare chip 31 lower part which carried out F-C mounting, closure resin is supplied by the compressed air, it checks that closure resin has been filled to bare chip 31 perimeter, and supply of closure resin is suspended. According to this process, a vacuum

generator like the 1st operation gestalt is not required, but the closure resin spreading process to a highly reliable bare chip is acquired in simple and a low price.

[0015] In the above-mentioned 1-3rd operation gestalt, altogether, although the maintenance include angle of a printed wired board was not specified, when held at the general allowance include angle, the closure resin spreading process of high-reliability with the moisture resistance and other descriptions was securable [it was because it is exhausting compulsorily with the air blowdown means, and]. However, although not illustrated, if a printed wired board etc. is horizontally held in the 1-3rd operation gestalt, it cannot be overemphasized that the effectiveness that the closure resin spreading process of the bare chip in the highly reliable F-C mounting approach can be offered is expectable further.

[0016]

[Effect of the Invention] As explained above, according to this invention, effectiveness which is indicated below is done so. By the minor diameter through hole which prepared closure resin in the printed wired board Or since it was made the configuration which carries out inflow restoration compulsorily with the air blowdown means (vacuum devices, an air aspirator, and compressed-air equipment) connected with the minor diameter through hole Even if can attain shortening of closure resin spreading time amount, it becomes unnecessary to lean a printed wired board like before at the time of closure resin spreading and the gap between a bare chip and a printed wired board is narrow It can be densely filled up with closure resin in the meantime, and also the air currently mixed in closure resin is removable at the time of restoration.

[0017] Moreover, in the end point of the minor diameter through hole established in the printed wired board, and the air exhaust, it can be checked that it has filled up with closure resin between a printed wired board and a bare chip.

[0018] Therefore, it becomes unnecessary to lean a printed wired board, spreading of quick closure resin is attained, and the closure resin spreading process to the bare chip in the highly reliable flip chip mounting approach excellent in moisture resistance, endurance, and shock resistance can be offered.

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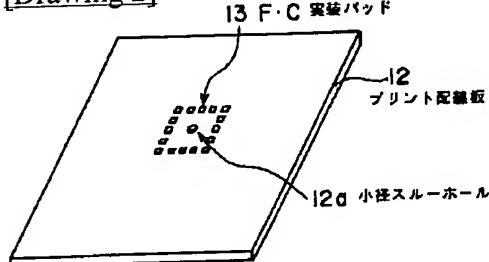
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DRAWINGS

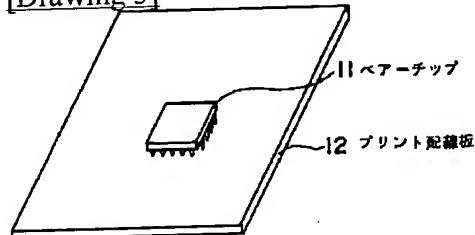
[Drawing 1]



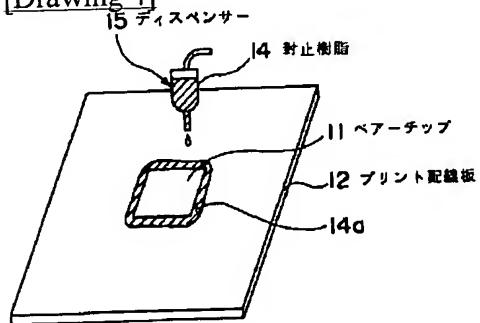
[Drawing 2]



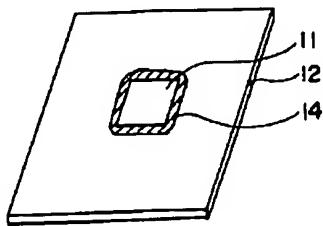
[Drawing 3]



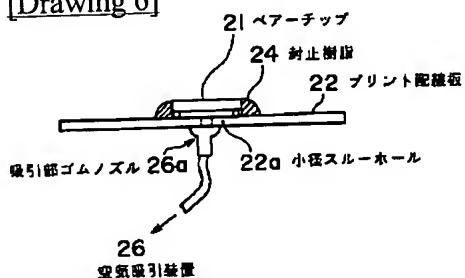
[Drawing 4]



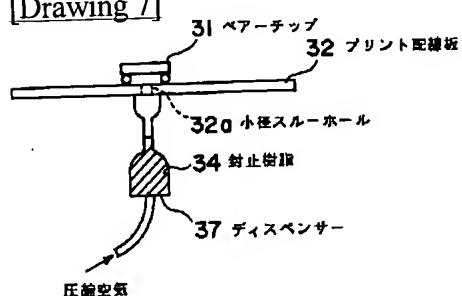
[Drawing 5]



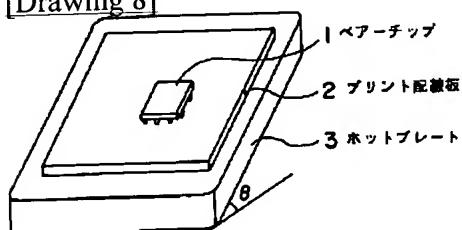
[Drawing 6]



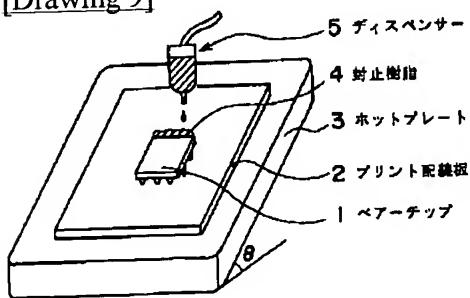
[Drawing 7]



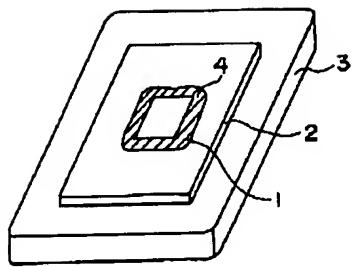
[Drawing 8]



[Drawing 9]



[Drawing 10]



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Patent Abstracts of Japan

PUBLICATION NUMBER : 09162525
 PUBLICATION DATE : 20-06-97

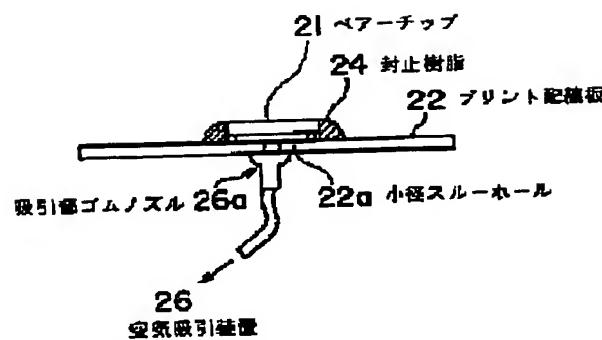
APPLICATION DATE : 06-12-95
 APPLICATION NUMBER : 07318053

APPLICANT : OKI ELECTRIC IND CO LTD;

INVENTOR : YOSHIDA AKIO;

INT.CL. : H05K 3/28 H01L 21/56

TITLE : PROCESS FOR APPLYING SEALING
 RESIN TO BARE CHIP IN FLIP CHIP
 MOUNTING



ABSTRACT : PROBLEM TO BE SOLVED: To provide a process for applying a sealing resin to a bare chip in a flip chip mounting method which has an excellent moisture resistance, durability and shock resistance and a high reliability to perform a resin sealing quickly and surely without any necessity of holding obliquely a printed wiring board in the case of the working of applying the sealing resin to the bare chip.

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(19)日本国特許庁 (JP)

(12) 公開特許公報 (A)

(11)特許出願公開番号

特開平9-162525

(43)公開日 平成9年(1997)6月20日

(51)Int.Cl.⁶
H 0 5 K 3/28
H 0 1 L 21/56

識別記号 庁内整理番号

F I
H 0 5 K 3/28
H 0 1 L 21/56

技術表示箇所
E
E

審査請求 未請求 請求項の数5 OL (全4頁)

(21)出願番号 特願平7-318053

(22)出願日 平成7年(1995)12月6日

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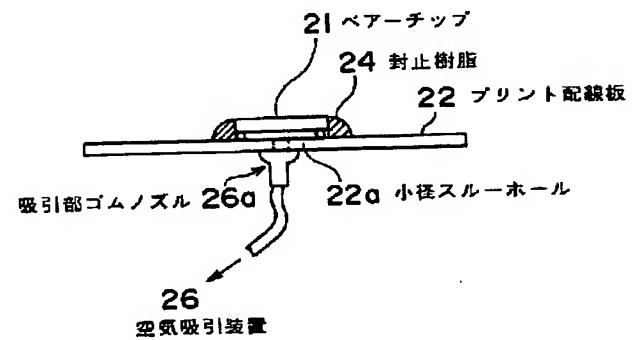
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(54)【発明の名称】 フリップチップ実装ベアーチップへの封止樹脂塗布工程

(57)【要約】

【課題】 封止樹脂塗布作業時に、プリント配線板を傾けて保持する必要がなく、迅速かつ確実に樹脂封止され、耐湿性、耐久性、耐衝撃性に優れた高信頼性のフリップチップ実装方法におけるベアーチップの封止樹脂塗布工程を提供する。

【解決手段】 フリップチップ実装方法におけるベアーチップへの封止樹脂塗布工程において、ベアーチップ21とこれを実装するプリント配線板22間に空気を小径スルーホール22aに係着した空気吸引装置26で排気すると同時に、封止樹脂24を流入し、ベアーチップ21とプリント配線板22間に封止樹脂が充填されたことを確認した後、封止樹脂の塗布作業を終了する。



【特許請求の範囲】

【請求項1】 フリップチップ実装方法における封止樹脂の塗布工程において、前記フリップチップ実装ベアーチップとプリント配線板間の空間を空気排出手段によつて排気し、樹脂封止を行うことを特徴とするフリップチップ実装ベアーチップへの封止樹脂塗布工程。

【請求項2】 前記空気排出手段が、フリップチップ実装ベアーチップへの封止樹脂塗布作業域に設けられた真空装置である請求項1記載のフリップチップ実装ベアーチップへの封止樹脂塗布工程。

【請求項3】 前記空気排出手段が、プリント配線板のベアーチップ下面との対向位置中心部に設けられた小径スルーホールに連結された空気吸引装置である請求項1記載のフリップチップ実装への封止樹脂塗布工程。

【請求項4】 前記空気排出手段が、プリント配線板のベアーチップ下面との対向位置中心部に設けられた小径スルーホールに連結され、圧縮空気により駆動されるディスペンサーである請求項1記載のフリップチップ実装ベアーチップへの封止樹脂塗布工程。

【請求項5】 前記プリント配線板が水平保持された請求項1、2、3又は4記載のフリップチップ実装ベアーチップへの封止樹脂塗布工程。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は、フリップチップ実装（以下F・C実装という）方法における耐湿性、耐久性、耐衝撃性に優れた封止樹脂塗布工程に関する。

【0002】

【従来の技術】従来のF・C実装方法は以下に示す工程順序で行われていた。すなわち、

(1) ベアーチップ1を半田付け及び熱圧着等によりプリント配線板2に搭載した後、ベアーチップ1が搭載されたプリント配線板2をホットプレート（又は電気炉）3により60～100°Cに加熱する。

(2) プリント配線板2を加熱中は、ベアーチップ1を搭載したプリント配線板2は傾けておく（図8参照、θは傾斜角度を示す）。

(3) 加熱された状態にある、ベアーチップ1を搭載したプリント配線板2のベアーチップ1上辺側に、封止樹脂4をディスペンサー等5により、必要量滴下する（図9参照）。

(4) プリント配線板2に滴下された封止樹脂4は重力によりベアーチップ1下面を伝わるという、いわゆる、封止樹脂4の流動性のみによりベアーチップ1の下面に樹脂を回らせて充填し封止していた（図10参照）。

【0003】

【発明が解決しようとする課題】しかしながら、上述のF・C実装方法における封止樹脂の塗布工程では、封止樹脂は傾斜面を重力により流動してベアーチップ1下部に回り込むため、塗布作業に長時間を要するという問題が

ある。

【0004】また、ベアーチップとプリント配線板とのギャップが小さい場合や、流動性の悪い封止樹脂を使用した場合には、ベアーチップとプリント配線板との間に、封止樹脂が完全に回り込まない場合があり、耐湿性、耐久性及び耐衝撃性の点で問題点があった。

【0005】さらに、封止樹脂がベアーチップ1下面まで回り込んで充填されているか否かは、ベアーチップを剥がさないと確認が不可能であり、また、封止樹脂4を滴下するとき、プリント配線板2を傾ける必要があり、大きなプリント配線板へのF・C実装における封止樹脂の塗布は困難であるといった問題点があった。

【0006】本発明は、上記問題点を解決するためになされたものであり、その目的とするところは、封止樹脂の塗布作業を行うのにプリント配線板を傾斜する必要がなく、空気排出手段によりベアーチップの下部空間が迅速に樹脂封止され、かつ、耐湿性、耐久性、耐衝撃性に優れた高信頼性のF・C実装方法におけるベアーチップの封止樹脂塗布工程を提供することにある。

【0007】

【課題を解決するための手段】上記目的を達成するため、本発明は、F・C実装方法におけるベアーチップへの封止樹脂塗布工程において、ベアーチップとこれを実装するプリント配線板間の空気を真空装置等の空気排出手段で排出すると同時に、封止樹脂を充填して、ベアーチップの封止樹脂塗布作業を完工する工程を設けたものである。

【0008】これによれば、プリント配線板のベアーチップとの対向域の中心部に小径スルーホールを設けているので、このスルーホールから封止樹脂が迅速に充填され、プリント配線板を傾斜する必要がなくなる。また、封止樹脂が充填されたことを小径スルーホール部において確認することができ、充填された封止樹脂に混入している空気も充填時に同時に除去される。

【0009】

【発明の実施の形態】以下、本発明の実施形態について図面を参照して説明する。図1～5は本発明の第1の実施形態としての工程図である。図1はベアーチップ1 1を示す外観斜視図であり、その下面周辺には多数の球状電極のバンプ1 1 aが配列されている。図2はベアーチップ1 1を搭載することを目的としたプリント配線板1 2の外観斜視図であり、F・C実装パッド1 3が配設されており、その中心部には小径スルーホール1 2 aが配設されている。

【0010】次に、この発明に係るF・C実装方法の作業工程について説明する。まず、ベアーチップ1 1の下面周辺に多数の微小な球状電極バンプ1 1 aを配列する（図1）。このバンプ1 1 aをプリント配線板2のF・C実装パッド1 3に位置合わせした後（図2）、半田付け、熱圧着等により接続搭載する（図3）。

【0011】プリント配線板12にペアーチップ11がF・C実装された後、プリント配線板12のペアーチップ11の周囲に封止樹脂14をディスペンサー15等にて滴下供給する(図4)。ディスペンサー15等による封止樹脂の滴下供給は樹脂封止域を真空状態にすることを可能とした容器(図示せず)空間内で作業を行い、ペアーチップ11周囲への封止樹脂を供給しつつ、上記容器内を真空状態にして行く。容器内が真空状態に近づくにつれ、ペアーチップ11周囲の封止樹脂は減少するため、その減少分を補完するため真空状態の進行と共に、ペアーチップ11の周囲には封止樹脂の供給を行う。

【0012】このようにすることで、ペアーチップ11の周間に封止樹脂が十分供給できる。そして、ペアーチップ11下部のプリント配線板12の小径スルーホール12aより封止樹脂が確認できるようになった時に真空状態を停止し、F・C実装を行ったペアーチップ11周囲への封止樹脂14の供給を終了する。図5はこの状態を示す要部外観斜視図である。

【0013】また、図6は本発明に係るF・C実装方法における封止樹脂塗布工程の第2の実施形態を示すもので、ペアーチップ21とプリント配線板22間の空気を吸引する装置を示した要部側断面図である。この実施形態では、小径スルーホール22aに空気吸引装置26の吸引部ゴムノズル26aを連結して矢印方向に空気を吸引することによってペアーチップ21の外周にディスペンサー等(図示せず)によって滴下供給された封止樹脂24を、プリント配線板22との間に吸引し充填するF・C実装への封止樹脂の供給方法を示している。そして、この実施形態によれば、空気吸引装置26の吸引部ゴムノズル26aにて封止樹脂を確認したとき、空気吸引装置26の駆動を停止すればよく、これにより、封止樹脂が高効率でペアーチップ22下部空間が充填され、目的通りの効果が得られるのである。

【0014】さらに、図7は本発明の第3の実施形態を示す要部側断面図で、ディスペンサー等37により直接F・C実装部へ封止樹脂34を供給する構成が示されている。この場合は、まず、プリント配線板32にベアーチップ31をF・C実装する。F・C実装したベアーチップ31下部のプリント配線板32に設けられた小径スルーホール32aへディスペンサー37を挿着して圧縮空気で封止樹脂を供給し、ベアーチップ31周囲に封止樹脂が満たされたことを確認して封止樹脂の供給を停止する。この工程によれば、第1の実施形態のような真空発生装置を要せず、簡易かつ低価格にて高信頼性のベアーチップへの封止樹脂塗布工程が得られるのである。

【0015】上述の第1～3実施形態においては、すべて、プリント配線板の保持角度を指定していないが、空気排出手段によって強制的に排気しているためであり、一般的な許容角度に保持されれば、耐湿性その他の特徴を有した高信頼性の封止樹脂塗布工程を確保でき

た。しかし、図示しないが、第1～3実施形態においてプリント配線板等を水平に保持すれば、更に、高信頼性のF・C実装方法におけるペアーチップの封止樹脂塗布工程を提供できる効果が期待できることはいうまでもない。

[0016]

【発明の効果】以上説明したように、本発明によれば、以下に記載されるような効果を奏する。封止樹脂をプリント配線板に設けた小径スルーホールにより、あるいは、小径スルーホールに連結された空気排出手段（真空装置、空気吸引装置及び圧縮空気装置）によって、強制的に流入充填させる構成にしたので、封止樹脂塗布時間の短縮化が図れ、従来のように、封止樹脂塗布時にプリント配線板を傾けなくともよくなり、ペアーチップとプリント配線板間のギャップが狭くても、この間に封止樹脂を密に充填できるほか、封止樹脂に混入している空気も充填時に除去することができる。

【0017】また、プリント配線板に設けた小径スルーホールと空気排出装置との連結点において、プリント配線板とベアチップ間に封止樹脂が充填されたことを確認できる。

【0018】従って、プリント配線板を傾ける必要がなくなり、迅速な封止樹脂の塗布作業が可能になり、耐湿性、耐久性、耐衝撃性に優れた高信頼性のフリップチップ実装方法におけるベアーチップへの封止樹脂塗布工程を提供することができる。

【図面の簡単な説明】

【図1】本発明の第1の実を示す外観斜視図である。

【図2】本発明の第1の実施形態におけるプリント配線板を示す外観斜視図である。

図2-1 本発明の第1の実施形態におけるプリント配線

板にペアーチップを搭載した状態図である。
【図3】本発明の第1の実施形態におけるペアーチップ

【図4】本発明の第1の実施形態における、
への封止樹脂塗布工程図である。

【図5】本発明の第1の実施形態のT・C実表

ラップへの封止樹脂塗布工程終了時を示す斜視図である。
図12 第2の密着形態を示す要部側断面図である。

【図6】本発明の第2の実施形態を示す、要部側断面図である。

【図7】本発明の第3の実施形態を示す、安部断面図である。

【図8】従来のペアーチップ搭載工程を示す要部外観図である。

【図9】従来のペアーチップ[®]封止樹脂塗布工程を示す要部外観斜視図である。

【図10】従来のペアーチップ封止樹脂塗布完了図である

【符号の説明】
○ 1 2 3 ベアーチップ

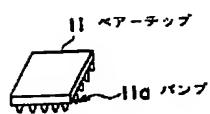
11, 21, 2

12, 22, 32 プリント配線板

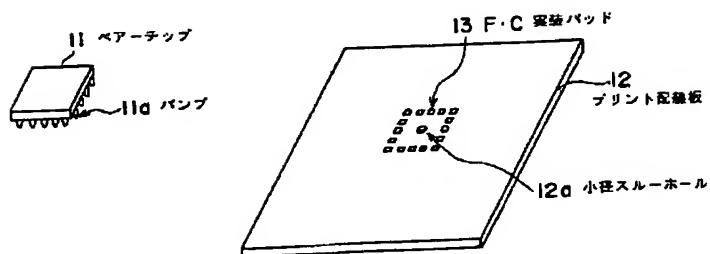
12a, 22a, 32a 小径スルーホール
13, 23 F・C実装パッド
14, 24, 34 封止樹脂

15, 17, 37 ディスペンサー
26 空気吸引装置

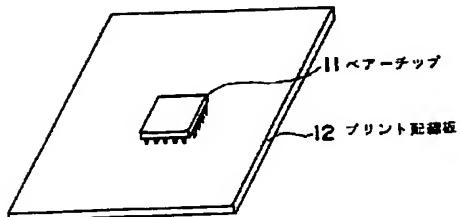
【図1】



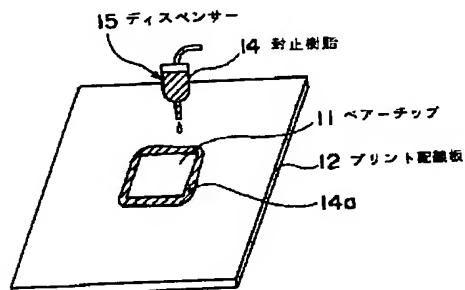
【図2】



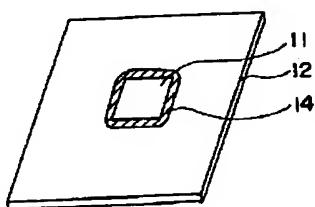
【図3】



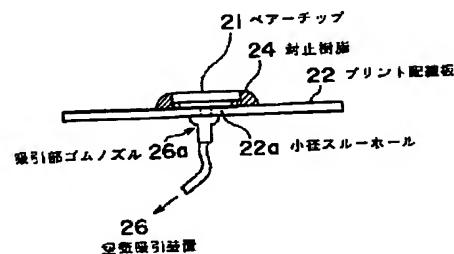
【図4】



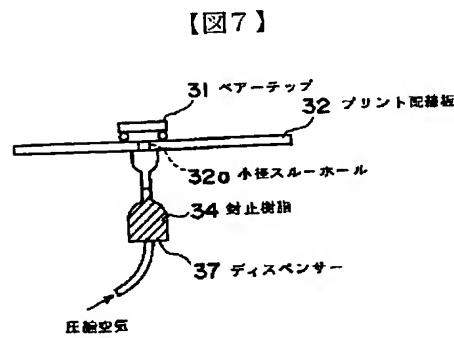
【図5】



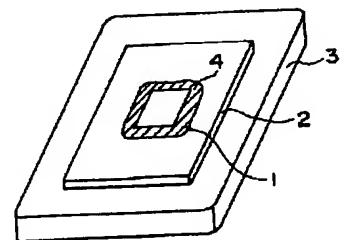
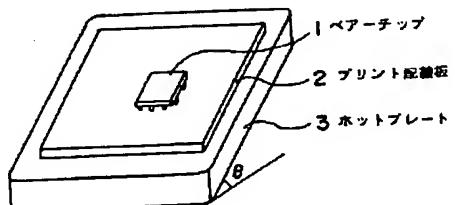
【図6】



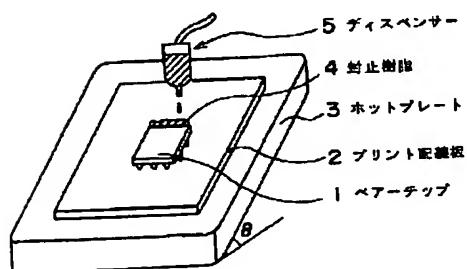
【図10】



【図8】



【図9】



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